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ABSTRACT

This paper considers the effect of computer use (word processing) on the compositions written by minority college freshmen in basic writing courses, focusing in particular on differences in composition quality and the kinds of thinking evidenced in the essay, as well as determining whether any differences were gender related. Subjects were 40 Black and Hispanic college basic writers enrolled in first-year special instruction composition classes at two large midwestern universities, one of which requires that all writing courses be taught in a word processing environment. Students were selected for special instruction because their high school performances suggested a strong potential for success in college despite low standardized test scores. Evaluation of the compositions showed that although both groups improved slightly from pretest to posttest, the quality of writing of neither group improved significantly more than the other, nor were any significant differences found based on gender. Evaluation of thinking skills also showed no significant differences based on use or nonuse of word processing in composition, nor any differences based upon gender. These findings are similar to those found in earlier studies of similar low achieving students. Thus, although it is suggested that the medium used in writing might well make a difference in the writing of some groups of writers, this investigation failed to show such a difference for these first year basic college writers. Three tables and one figure are included. (15 references) (EW)

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RESEARCH INTO WORD PROCESSING AND THE BASIC WRITER

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As computers have made their way into writing classes over the past several years, researchers have put forth a concerted effort to assess the influence of word processing on student writers and their products. Yet, despite the many studies conducted since 1981, few have supported the hypothesis that students write more successfully when they use word processing. Recent surveys of research in computers and composition, for example, indicate that out of eleven studies that focused on average writers and employed trained raters to evaluate writing samples, students in only four of the investigations demonstrated improved skills (see Hawisher, 1986, 1988). What's intriguing about research with basic writers, however, is that out of six studies that examined the writing of low-achieving students, five reported improvement in writing ability. Thus, based on these research reports, word processing seems to be an especially promising tool for students deficient in writing skills.

This was our initial hypothesis as we began our research with first-year college basic writers. But we also wondered why these unskilled writers in previous research seemed to write more successfully with word processing. Although most studies attributed writing improvement to ease of revision, other factors influencing composing might contribute to improved writing as well. Did, for example, the kinds of thinking basic writers demonstrated when they used computers as writing tools differ from that which they exhibited when writing with

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conventional methods? Perhaps computers allowed basic writers more intellectual energy to think and, therefore, to learn and write more successfully by freeing them from the laborious task of writing by hand. Another question we had concerned the ways in which male and female students might use computers differently. Some preliminary evidence suggested that while female students in general seemed to have less confidence in their ability to work with technology (Collis & Ollila, 1986), low-achieving female students had more positive attitudes about computers than high achievers (Swadener & Hannafin, 1987). These positive attitudes toward computers might exert a different and perhaps more beneficial influence on the quality of these female students' texts when compared to those of their male counterparts. Our purpose in this research, then, was threefold: 1) to examine the quality of student essays produced by basic writers with and without word processing; 2) to describe the kinds of thinking evidenced in these student essays written with and without word processing; 3) to determine whether any differences in the above were gender related.

Related Studies

Although, as noted earlier, results of recent research in composition and word processing with basic writers is generally positive regarding student improvement in writing, differences among the studies seemed to warrant further investigation of this variable of quality. Three of the studies, for example, despite their focus on low-achieving students, had decidedly different populations of interest than the first-year college basic writers with which we were concerned (e.g., Burnett, 1984; Cirello, 1986; Pivarnik, 1985) and thus their results might not generalize to students in our study. Burnett's investigation was a single-case experimental study of an elementary school student with nine replications. That is, Burnett examined the writing of a first grader after the student had used word processing for eight weeks and compared it with baseline data she had collected at

the start of the experiment; she then repeated these same procedures with nine other low-achieving students whose class standing ranged from the first to the fifth grades. In viewing these 10 students as a group, she found that their writing improved significantly with word processing when holistic and analytical measures were applied to their stories. Burnett cautioned, however, that although the improvement in the writing of the majority of the elementary students was impressive, data regarding four of the students she studied were inconclusive. It should also be noted that students often perform differently when writing narratives than when writing expository texts, the focus of this investigation.

Although the writing samples in Cirello's (1986) research were written in response to expository prompts, findings in his study of 30 remedial tenth grade high school students were also mixed. His writing sample consisted of the New York Regents Competency Examination in Writing in which students are required to complete three writing tasks: a business letter, a report, and a persuasive essay. Students in the word processing condition scored significantly higher than the control group on the report and the composition, but not on the business letter. Cirello hypothesized that the shorter writing task of a business letter did not lend itself to revision as did the report and composition and, therefore, prevented students from taking full advantage of the capabilities of word processing. He therefore concluded that on this shorter piece of writing the experimental group was unable to improve significantly more than the control group. Unlike Cirello's study, Pivarnik's (1985) research with low-achieving high school students and word processing supported both her hypotheses of improved writing. Using one sample of writing as a post-test for the 76 students in the experimental and control groups, Pivarnik obtained significantly higher scores in the holistic ratings for basic eleventh grade writers when they used word processing for their personal essays. When she attempted to verify the higher scores with 13 of the students on another

piece of writing, she found similar positive results. Thus, while these results with elementary and high school developmental writers using word processing are encouraging, questions still remain regarding the precise nature of the relationship between basic writers and word processing.

This situation also seems to hold true for three investigations that studied basic writers in the college setting, two of which reported improved quality ratings when students worked with word processing. In examining the writing of 10 developmental first-year college writers (who happened to be female), King, Birnbaum, and Wageman (1984) found significantly higher scores in content, organization, and sentence completeness and variety with the experimental word processing group than with the control group. Yet the experimental group's essays did not score significantly higher when judged on the dimension of standard usage. The study's findings seem to suggest that word processing was beneficial for improving particular features of student texts but not for enhancing others. Beserra, in her case studies of college basic writers, also reported mixed results regarding the quality of student writing when judged by trained raters. Although five of the six students she studied achieved higher ratings with word processing than with pen and paper on the personal narrative and four received higher scores on the transactional writing, Beserra attributed student improvement, in part, to raters judging the longer essays students wrote with word processing more positively than the shorter handwritten pieces. And, since no statistical tests were run to determine whether the essays improved significantly in the computer condition, it is difficult to state with confidence the precise influence of word processing. The last of these studies with unskilled college writers, Posey's (1986) research with 13 first-year students, suggests that students in the pen and paper condition made greater progress in writing than those students writing in the word processing condition. On the post-test, however, students in both the experimental and control group

were required to complete the writing task with pen and paper even though the experimental group had written all semester with word processing. These procedures seem especially demanding for students who have difficulty with writing in the first place. To teach basic writers how to write with a new tool and then to deprive them of this tool when testing their writing seems certain to ensure failure. Posey's investigation, however, is the only study of the six reviewed here that failed to support the notion that unskilled writers improve when word processing is introduced into the basic writing class.

The results of these studies with basic writers seemed sufficiently promising to warrant a further investigation of the relationship between unskilled writers and computers. As stated earlier, we wondered if basic writers, once freed from the cumbersome task of writing by hand, might not devote more of their time to the intricacies of organizing their ideas and setting them forth in a manner more appropriate to that expected of them in college writing courses. We also wondered if the technology might not also function as a motivator for students, encouraging them to spend greater amounts of time on their writing and, thus, once again, help them come closer to approximating the type of discourse that is prized in the academic setting. We hypothesized that basic writers would not only improve their writing with word processing but also would demonstrate the kinds of thinking in their essays that usually result in higher ratings on holistically graded texts.

Only two previous studies of which we are aware tried to assess how computers might interact with the cognitive processes of students when they used word processing. The first (Woodruff, Lindsay, Bryson & Joram, 1986) hypothesized that word processing would be more helpful to enriched or advanced eighth graders than to average students because the cognitively-advanced students would take advantage of the easy and quick revision afforded by computers. In their study of sixteen students, the researchers concluded that there was some support for this

hypothesis because the style rating of the enriched students improved significantly with word processing whereas this improvement did not occur for the average students when they used computers. Woodruff and his colleagues defined style as "the degree to which the paper flowed smoothly due to a clearly expressed and well thought out theme." (p. 8.) The other study (Coulter, 1986) tried to determine whether the use of word processing with first-year college students had an effect on their cognitive development. Using 62 students as her sample, Coulter tested the students at the start and end of the semester, using the Cognitive Analysis Project test (Renner, 1979). On the post-test she found that, whereas no students in the control group advanced to the Piagetian stage of formal operational thought, four students made such progress in the experimental group. From these results, she concluded that word processing might have a small effect on cognitive development. Thus it would seem that, although researchers suspect that writing with word processing might interact in different ways with students' cognitive processes than writing by hand, as of yet there is little evidence to support this hypothesis.

Before this discussion of related studies in word processing and basic writers is concluded, some mention of the writing instruction students received in the above research seems appropriate. All these studies advanced the argument that change or lack of change in writers' behavior or products could not be attributed to computers alone--that the writing instruction students received was crucial to shaping the influence of computers. When instruction was a part of the context or, for the experimental studies, a part of the treatment, researchers described the teaching methodology as process-oriented. That is, writing was viewed as an activity in which student writers engage recursively in the planning, composing, and revising of multiple drafts. The description also often included "conferencing," that is, teacher and student conferring between drafts and/or peer evaluation. The

researchers were not only sensitive to the role instruction played in combination with word processing but also took pains to create a setting in which the pedagogy was grounded in theory and research. Thus these studies of computers and basic writers explored how word processing in combination with a process-centered teaching methodology influenced writers--their processes and their products.

Method

Overview

In an effort to shed further light on the ways in which word processing interacts with basic writers and their products, we conducted an experimental study whose aim was to assess whether these students wrote more successfully with word processing than with conventional tools and whether they demonstrated different thinking skills in essays written at computers. We also tried to determine how possible differences in these variables might relate to gender. Forty first-year college basic writers (20 writing with word processing and 20 writing with conventional tools) completed drafts and revisions of a transactional piece of writing at the beginning and end of a 16-week semester. Students wrote these essays over a 3-day period of time, with instructors collecting the work in progress after each 50-minute class session. In this way, we tried to assure students an ample amount of time in which to write and revise. The 80 final drafts culled from these writing samples provided the data for this investigation. Although students in the word processing condition wrote the drafts and revisions of the pre-test by hand during the first week of the semester, all subsequent writing was completed with Wordstar software at Zenith microcomputers in a classroom-laboratory setting. Students in the control group, on the other hand, completed all writing tasks with pen and paper throughout the semester. Trained raters were employed to evaluate the quality of the 80 writing samples from the forty students. In addition, researchers categorized the kinds of thinking students demonstrated in both pre- and post-tests with Alan C.

Purves's scheme (see Carlson, 1988; Park, 1988) for classifying thinking skills (see Figure 1). By using the Purves instrument to describe thinking skills in conjunction with a holistic instrument to judge writing quality, this study attempts to add to current research by suggesting new methods by which computers and writing might profitably be studied.

INSERT FIGURE 1 ABOUT HERE.

Sample

The participants in this study were 40 college basic writers enrolled in first-year composition classes at two large midwestern universities, one of which requires that all writing classes be taught in a word processing environment. The experimental group consisted of twenty students who completed their assignments with word processing and the control group of twenty students who completed their assignments by hand. To control for teacher bias, George Hillocks (1986) in his meta-analysis of writing research stipulated that an investigation have at least twice the number of instructors as it has treatments. In conforming with Hillocks's criterion, we selected students for this study from the classes of four instructors (two from each university) and then matched them for gender and for English scores on the American College Test (ACT). Thus, although the instructors in this investigation described their teaching strategies as process-oriented and required multiple drafts of writing from their students, we tried to minimize the variable of instruction as a potential biasing influence on the outcome of the research. All instructors also viewed the purpose of their course as one which prepares students for subsequent writing that would be required of them during their four years in college.

The sample consisted of forty black and hispanic students who were selected for special instruction by their respective universities because their performance in high school indicated a strong potential for success in college, despite ACT scores typically too low for standard college admission. The special instruction at both

universities required students to meet for five hours a week for writing instruction rather than for the customary three hours in other first-semester writing courses at each university. The mean English ACT score was 16.9 (SD = 2.9) for the experimental group and 17.4 (SD = 2.3) for the control group, with scores ranging from 14 to 21. The writing from eight pairs of males and twelve pairs of females that were also matched for ACT scores made up the data for this study.

Writing Tasks[1]

Two similar essay prompts were constructed for the pre- and post-test, with each requiring students to read a selection from USA Today and then to write an essay based on their reading. For one topic, students were to explain their life goals and compare them with the goals of other college freshmen described in the article; for the other, they were to explain their attitudes toward public high school education and compare them with the attitudes expressed by others in another article. Each assignment was thought to be representative of writing tasks students would be asked to complete during their college years and was intended to result in a transactional piece of writing. The topics were counterbalanced across conditions so that half the students in each group wrote on one topic for their pre-test and on the other topic for their post-test. Although each of the writing topics was similar in content and task, the topics were rotated in this way to reduce the potentially biasing influence of a particular writing assignment.

Instrumentation

Holistic Scoring of Essays

To come up with criteria for holistically scoring the essays, we first read through the students' papers and arranged them in what we judged to be the top

[1]The authors are grateful to Suzanne Ross who created and piloted these writing assignments during the summer of 1986 with a segment of the same population of students as was used in this investigation.

half and bottom half according to their quality. We repeated this process for each half so that the essays were divided roughly into four levels of competence. Based on our reading of the essays, we then derived six categories of performance and wrote a short paragraph describing each category. The first category assessed how well students were able to integrate the readings into their essays, with a high score of 4 indicating that the material had been made part of the argument of the essay and a low score of 1 indicating that there was virtually no mention of the readings. The next category judged the thesis of an essay, with a strong paper exhibiting a sense of thesis throughout and a weak paper sometimes giving the illusion of a thesis but shifting its focus as it progressed. A high score on a paper for the next category indicated a fluent structure and organization, with each part of the paper contributing to the demands of the point it was trying to make; a low score suggested that the paper could not be divided into discrete yet related units of meaning. Another category assessed cohesion and topical unity in an essay. A high score for the essay suggested a paper that flowed smoothly from one sentence to the next and a low score indicated that, although there seemed to be some unity sometimes within paragraphs, the sentences in these paragraphs lacked connection. The next category was intended to judge a student's use of examples, with a good paper exhibiting explanations of its support and a poorer paper attempting no analysis of the examples presented. And, finally, the last category assessed students' proficiency in grammar and mechanics: a high score indicated an essay free of grammatical problems whereas a low score suggested a paper with frequent and intrusive errors. Thus raters were to assign a rating from 1 to 4 to each paper based on the fit between the rubric and the given essay. A 4 indicated an essay that was competent in all the above categories, and a 1 described a paper that was deficient on most of the given criteria.

Three experienced raters were employed to score the essays. Before being scored, all handwritten essays were entered on a computer so that raters could not distinguish the word processing papers from those written with pen and paper. Raters first applied the holistic criteria to essays not in the study until they could reach consensus regarding the characteristics of writing conforming to each level; they then scored the 80 essays for the study. Although raters scored both pre- and post-tests, the essays were coded in such a way that they did not know which drafts they were rating. All three raters scored the 80 writing samples in the study, and, when interrater reliability was estimated, the coefficient alpha was .82 for pre-tests and .80 for post-tests.

Analytical Scheme for Describing Thinking Skills

During the spring of 1985, Alan C. Purves developed an analytical scheme specifically to evaluate thinking skills evident in writing samples from the Graduate Record Examination (GRE) and from the Test of English as a Foreign Language (TOEFL). (See Figure 1 for an overview of this instrument.) This instrument is especially useful in describing the kinds of thinking expected and rewarded in college settings since part of its purpose is to assess how closely students' thinking approximates that which is prized in academic discourse within the United States. It consists of thirteen dimensions which are grouped into the larger categories of Content and Thinking, Organization, and Style and Tone. Dimensions represented within these categories include such features as the degree to which writers make valid connections among the various items within their texts, the extent of inference-making in which they engage beyond the text, and the success with which they synthesize the information they are given to form new generalizations. For each of the dimensions, students could earn a score from 1 to 5, with 5 indicating that a quality was displayed in a highly appropriate fashion. A score of 1, in contrast, suggested that the essay was particlarly low in this quality. A 3 indicated that a

student had performed adequately on the stipulated dimension. The scheme is both descriptive and evaluative in that students who score highly on the 13 dimensions are likely to demonstrate competency in the kinds of writing we have come to expect in college settings. (See Carlson, 1988 and Park, 1988 for a further discussion of this instrument.)

Two researchers scored the 80 pre- and post-tests, using the Purves analytical scheme. To calculate the percentage of agreement between the raters, every tenth rating was compared for the 1040 individual scores. Using this method, the two researchers agreed precisely on 77% of the codings; for the ratings on which they differed, they never disagreed by a score of more than 1 on a scale of 5. When the two researchers did not agree on the rating for a particular dimension, the ratings of a third independent researcher were used.

Results

Quality of Writing

The first task of this research was to examine the quality of student essays produced with and without word processing. When the holistic scores on the pre- and post-tests were examined, there was no significant difference in the means of the improvement ratings between the two groups. (See Table 1.) Although both groups of students improved slightly from pre- to post-tests, neither group improved significantly more than the other. Nor were there significant differences in the means of the improvement ratings when the scores were compared in regard to gender. (See Tables 2 and 3.) Although the females in the word processing condition scored slightly higher than the females who wrote by hand and the males in the handwriting condition scored slightly higher than the males who used computers, the differences in the means of the improvement ratings of the two groups were nonsignificant. Based upon these findings, then, it would seem that the quality of writing does not improve any more for basic writers when they write

with word processing than when they write by hand regardless of whether they are males or females.

(INSERT TABLES 1, 2, AND 3 ABOUT HERE.)

Kinds of Thinking

In examining the improvement ratings in thinking skills of students in both conditions, we found few differences between the mean scores of those students writing in the two conditions. (See Table 1.) The only significant difference seemed to be in students' ability to draw relationships among the various items of information presented in their essays, and for this dimension the difference appeared to have more to do with the handwriting group's experiencing a slight loss from pre- to post-test ($M = -0.30$, $SD = 0.7$) than in any significant gain the word processing group might have made ($M = +.10$, $SD = 0.6$). We also found no significant differences in the means of the improvement scores for thinking skills between the groups when we looked at gender. (See Tables 2 and 3.) Regardless of whether students were male or female or whether they worked with word processing or pen and paper, their overall improvement in the 13 dimensions of thinking as measured by the Purves instrument was minimal. Thus the findings of this study seem more remarkable for the similarities in scores between the two groups than for any differences that might be attributed to the tools with which students wrote.

Discussion and Conclusions

In a previous study with able college freshmen (see Hawisher, 1987), one of the authors concluded that the writing tool did not seem to be the variable that influenced the success of above-average students' essays. Based on the findings of the current investigation, the same conclusion may be extended to the writing of college basic writers. Whatever improvement in writing that was noted among low-achieving students in the studies cited earlier (e.g., Pivarnik, 1986; Cirello, 1986;

King, Birnbaum, and Wageman, 1984; Beserra, 1986) did not hold true for this investigation. But if the students' writing we studied did not improve in overall quality or in the kinds of thinking prized in the academic setting, nor did it suffer as a result of students composing at computers. Thus we can argue that basic writers adapt as well and as easily to writing courses taught on computers as they do to conventional first-year writing classes.

Several additional explanations come to mind as to why these writers did not show higher improvement ratings in both writing quality and thinking skills for essays written at computers than for essays written with conventional methods. One semester may not be sufficiently long enough for students to internalize the features of a word processor to the extent that writing and thinking at a computer becomes second nature to them. In the college setting, however, these students commonly are enrolled in first-year composition classes for only a semester, and thus to extend a study such as this to even a year-long investigation becomes problematic. Nonetheless one-semester studies may fail to capture emerging differences that remain imperceptible after 16 weeks of research.

In addition, students may not have had the opportunity to learn thinking strategies that are commonly prized in the college setting. Although the first-year courses at both universities are intended to prepare students for writing expected of them in other courses throughout the university, these thinking strategies were not taught explicitly. Competent student writers are apt to learn the kinds of thinking measured by the Purves instrument more readily in first-year writing courses than basic writers, who are still grappling with more elementary writing problems. Instruction in these courses for basic writers tends to be aimed at these more essential literacy problems rather than emphasizing the kinds of thinking expected in writing for college courses.

Accompanying this explanation is also the possibility that in writing with computers on a daily basis these student writers might be missing valuable instruction, although not enough instruction to prevent them from scoring as well as the control group. That is, instead of discussing with classmates and instructors problems in writing, they may devote their class time primarily to writing and, in this way, learn less than they might with greater intervention in their learning processes. Although we have long known that students do not learn to write by listening to lectures, there is no research of which we are aware that suggests what a writing class with an ideal emphasis on writing, discussion, and instruction might look like. We do know from George Hillocks' (1986) conclusions in his meta-analysis of writing research that an environmental mode of instruction, which emphasizes the teacher, materials, and students, seems to yield more promising results in students' writing than the natural process mode, which primarily emphasizes student-initiated activities. What we don't know, however, is what shape this environmental or, as Arthur Applebee (1986) has appropriately named it, this "structured process" approach might take when computers become writing tools in the composition classroom.

It is also possible, as Nancy Kaplan (1987) argues, that we have not as yet devised a pedagogy to accompany computers when word processing becomes the method by which students are taught to write in composition classes. Kaplan asserts that different writing media may have different strengths and that instruction tailored to one (a print technology) may not be as effective when applied to another (an electronic technology). Thus, according to Kaplan, we may be putting students who <u>write</u> with word processing yet are <u>taught</u> with conventional process-oriented strategies of instruction at a decided disadvantage over students who write with pen and paper and are taught with these same methods.

Dawn and Raymond Rodrigues (1986) offer a similar argument. Although they believe that many process approaches for teaching writing can be adapted to computers, they state that "how students are taught to write with a word processor must be different from how they are taught to write without a word processor." (pp. 12-13) They then go on to argue that the social context in which students see one another's writing displayed on a monitor "necessarily forces teachers to consider new classroom approaches." (p. 13) Thus it is entirely possible that until we direct our efforts to examining the different kinds of teaching and social interactions that computers tend to encourage, we shall continue to find contradictory results.

This research, then, found few differences in the thinking and overall quality of the compositions of basic writers, male or female, when writing with word processing or when writing by hand. Although we believe that the medium might well make a difference in the writing of some groups of writers, this investigation failed to advance such a conclusion for first-year basic college writers.

References

Beserra, W. C. (1986). Effects of Word Processing Upon the Writing Processes of Basic Writers. (Doctoral Dissertation, New Mexico State University, 1986). *Dissertation Abstracts International*, 48, 34-A.

Burnett, J. H. (1984). Word processing as a writing tool of an elementary school student (a single-case experiment with nine replications). (Doctoral Dissertation, University of Maryland, 1984). *Dissertations Abstracts International*, 47, 1183-A.

Carlson, S. B. (1988). Cultural differences in writing and reasoning skills. In A. C. Purves (Ed.) *Writing across languages and cultures*. Newbury Park, CA: Sage.

Cirello, V. J. (1986). The effect of word processing on the writing abilities of tenth grade remedial writing students. (Doctoral dissertation, New York University, 1986). *Dissertation Abstracts International*, 47, 2531-A.

Collis, B. & Ollila, L. (1986). An examination of sex differences in secondary school students' attitudes toward writing and toward computers. *The Alberta Jouranal of Educational Research*, 32, (4), pp. 297-306.

Coulter, C. A. (1986). Writing with word processors: Effects on cognitive development, revision and writing quality. (Doctoral dissertation, The University of Oklahoma, 1986). *Dissertation Abstracts International*, 47, 2551-A.

Hawisher, G. E. (1986). Studies in word processing. *Computers and Composition*. 4, 6-31.

Hawisher, G. E. (1987). The effects of word processing on the revision strategies of college freshmen. *Research in the Teaching of English*. 21, 145-159.

Hawisher, G. E. (1988). Research update: Writing and word processing. *Computers and Composition*. 6, **.

Hillocks, G., Jr. (1986). *Research on written composition: New directions for teaching*. Urbana, IL: NCTE.

Kaplan, N. (1987). *The technologies of teaching*. Paper presented at the Penn State Conference on Rhetoric and Composition, State College, PA.

King, B., Birnbaum, J. & Wageman, J. (1984). Word processing and the basic college writer. In T. Martinez (Ed.), *The written word and the word processor*. Philadelphia, PA: Delaware Valley Writing Council.

Odell, L. (1977). Measuring changes in intellectual processes as one dimension of growth in writing. In C. R. Cooper & L. Odell (Eds.), Evaluating writing. Urbana, IL: NCTE.

Park, Y.M. (1988). The rating of student performance in written composition. In A.C. Purves (Ed.), *Writing Across Languages and Cultures*. Newbury Park, CA: Sage.

Pivarnik, B., (1985). The effect of training in word processing on the writing quality of eleventh grade students. (Doctoral Dissertation, The University of Connecticut, 1985). *Dissertation Abstracts International*, 46, 1827-A.

Posey, E. J. (1986). The writer's tool: A study of microcomputer word processing to improve the writing of basic writers. (Doctoral Dissertation, New Mexico State University, 1986). *Dissertation Abstracts International*, 48, 39-A.

Renner, J.W. (1979). The relationship between intellectual development and written responses to science questions. *Journal of Research in Science Teaching*, 16 (4), 279-299.

Rodrigues, D. & Rodrigues, R.J. (1986). *Teaching writing with a Word Processor, Grades 7-13*. Urbana, IL: NCTE.

Swadener, M. & Hannafin, M. (1987). Gender similarities and differences in sixth graders' attitudes toward computers: An exploratory study. *Educational Technology*, 27 (1), pp. 37-42.

Woodruff, E., Lindsay, P., Bryson, M., & Joram, E. (1986). Some cognitive effects of word processors on enriched and average 8th grade writers. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA.

Table 1
Improvement Ratings: Males and Females

Dimension		Word-processing (n=20)	Hand-written (n=20)	t(*df*=19)	two-tailed *p*
Quality	M	1.00	0.70	0.56	0.58 (NS)
	(SD)	(1.1)	(2.3)		
Adequacy of Information	M	0.05	0.40	-1.79	0.09 (NS)
	(SD)	(O.7)	(0.7)		
Richness of Information	M	0.00	0.15	-0.77	0.45 (NS)
	(SD)	(0.7)	(0.8)		
Relationships Drawn	M	0.10	-0.30	2.37	0.03
	(SD)	(0.6)	(0.7)		
Inferences Made	M	-0.10	0.20	-1.55	0.14 (NS)
	(SD)	(0.6)	(0.8)		
Synthesis	M	-0.05	0.25	-1.30	0.21 (NS)
	(SD)	(0.6)	(1.1)		
Evaluation	M	0.10	0.15	-0.29	0.77 (NS)
	(SD)	(0.7)	(0.8)		
Alternatives	M	0.10	0.05	0.22	0.83 (NS)
	(SD)	(0.7)	(0.7)		
Framing	M	0.10	0.05	0.27	0.79 (NS)
	(SD)	(0.7)	(0.9)		
Grouping	M	0.00	0.00	0.00	1.00 (NS)
	(SD)	(0.9)	(0.9)		
Unity	M	-0.15	0.10	-1.04	0.31 (NS)
	(SD)	(0.8)	(1.0)		
Objectivity	M	-0.30	0.05	-1.44	0.17 (NS)
	(SD)	(0.7)	(0.8)		
Tentativeness	M	0.00	0.00	0.00	1.00 (NS)
	(SD)	(0.6)	(0.9)		
Metalanguage	M	0.0	0.30	-1.24	0.23 (NS)
	(SD)	(0.6)	(0.9)		

Table 3
Improvement Ratings: Females

Dimension		Word-processing (n=24)	Hand-written (n=24)	t (df=22)	two-tailed p
Quality	M	1.17	0.17	1.42	0.17 (NS)
	(SD)	(1.0)	(2.2)		
Adequacy of Information	M	-0.08	0.50	-1.94	0.07 (NS)
	(SD)	(O.7)	(0.8)		
Richness of Information	M	-0.17	0.25	-1.70	0.10 (NS)
	(SD)	(0.4)	(0.8)		
Relationships Drawn	M	-0.08	-0.25	0.72	0.48 (NS)
	(SD)	(0.5)	(0.6)		
Inferences Made	M	0.00	0.17	-0.69	0.50 (NS)
	(SD)	(0.6)	(0.6)		
Synthesis	M	-0.25	0.25	-1.62	0.12 (NS)
	(SD)	(0.5)	(1.0)		
Evaluation	M	-0.08	0.00	-0.36	0.72 (NS)
	(SD)	(0.5)	(0.6)		
Alternatives	M	0.00	0.25	-0.90	0.38 (NS)
	(SD)	(0.6)	(0.8)		
Framing	M	0.00	0.08	-0.25	0.81 (NS)
	(SD)	(0.6)	(1.0)		
Grouping	M	-0.25	0.08	-0.92	0.37 (NS)
	(SD)	(0.8)	(1.00)		
Unity	M	-0.25	0.08	-0.92	0.34 (NS)
	(SD)	(0.6)	(1.0)		
Objectivity	M	-0.41	-0.08	-1.03	0.31 (NS)
	(SD)	(0.8)	(0.8)		
Tentativeness	M	-0.08	0.08	-0.61	0.55 (NS)
	(SD)	(0.5)	(0.8)		
Metalanguage	M	-0.17	0.33	-1.52	0.14 (NS)
	(SD)	(0.6)	(1.0)		

Table 2
Improvement Ratings: Males

Dimension		Word-processing (n=16)	Hand-written (n=16)	*t* (df=14)	two-tailed *p*
Quality	M	0.75	1.50	-0.80	0.44 (NS)
	(SD)	(1.3)	(2.3)		
Adequacy of Information	M	0.25	0.25	0.00	1.00 (NS)
	(SD)	(O.5)	(0.5)		
Richness of Information	M	0.25	0.00	0.51	0.62 (NS)
	(SD)	(1.0)	(0.9)		
Relationships Drawn	M	0.38	-0.38	2.02	0.06 (NS)
	(SD)	(0.5)	(0.9)		
Inferences Made	M	-0.25	0.25	-1.25	0.23 (NS)
	(SD)	(0.5)	(1.0)		
Synthesis	M	0.25	0.25	0.00	1.00 (NS)
	(SD)	(0.7)	(1.3)		
Evaluation	M	0.38	0.38	0.00	1.00 (NS)
	(SD)	(0.9)	(0.9)		
Alternatives	M	0.25	-0.25	1.41	0.18 (NS)
	(SD)	(0.9)	(0.5)		
Framing	M	0.25	0.00	0.61	0.55 (NS)
	(SD)	(0.9)	(0.8)		
Grouping	M	0.38	-0.13	1.14	0.27 (NS)
	(SD)	(0.9)	(0.8)		
Unity	M	0.00	0.13	-0.23	0.82 (NS)
	(SD)	(1.7)	(1.1)		
Objectivity	M	-0.13	0.25	-1.11	0.29 (NS)
	(SD)	(0.6)	(0.7)		
Tentativeness	M	0.13	-0.13	0.55	0.59 (NS)
	(SD)	(0.6)	(1.1)		
Metalanguage	M	0.25	0.25	0.00	1.00 (NS)
	(SD)	(0.5)	(0.7)		

FIGURE 1.

ANALYTICAL SCHEME FOR

CRITICAL THINKING SKILLS (PURVES, 1988)

Framework for Scoring

Content/Thinking

This dimension concerns what is written and the way it reflects the writer's manipulation of the subject. It is divided into a number of sub-criteria which should be scored separately.

1. Adequacy of information/ enough to fulfill assignment
2. Richness of additional information/ relevant allusion
3. Relationships drawn among items of information
4. Inferences made beyond the scope of the information
5. Synthesis/ drawing together ideas into a generalization
6. Evaluation/ the making of judgments as to merit of ideas
7. Alternatives/ considering other arguments/interpretations

Organization

This dimension concerns the structure of the written text both as a whole text and in its various parts.

8. Framing/ a detectable beginning, middle, and end
9. Grouping/ rational combining of information, ideas
10. Unity/ appropriateness of groupings to suggest whole

Style/Tone

This dimension refers to the manner in which the composition is presented, and particularly to the degree to which that manner matches the conventions of academic discourse in the United States.

11. Objectivity/ use of impersonal and detached language
12. Tentativeness/ use of semantic hedges and qualifiers
13. Metalanguage/ use of markers for propositions/paragraphs

Scoring

Each composition was rated in regard to the sub-criteria of the three dimensions. Raters assigned numerical values from `1' to `5' with a `1' indicating that the essay was low in a particular quality and a `5' indicating that the quality was displayed in a highly appropriate fashion. A 3 indicated adequate performance.